WebSphere Version 4.0.1 for z/OS Installation Tips

A successful installation of WebSphere Application Server (WebSphere) Version 4.0.1 for z/OS (and OS/390) requires careful planning and education. It also requires a good understanding of your z/OS system and many in-depth MVS systems programming skills. This paper augments the WebSphere "Installation and Customization" guide with our experiences and recommendations to install the WebSphere runtime.

Before you start . . .

Before you begin implementing WebSphere Application Server Version 4 on your z/OS or OS/390 system, you must make sure your people are trained and organized to implement the WebSphere runtime.

Participate in a Solutions Assurance Review

Use the Product Implementation Checklist to ensure a successful installation. IBM personnel can find the sample checklist on the Solutions Assurance web site. Click on "SAPR Guides/Product Checklists" and look under the zSeries and Software category.

This step is extremely important and is easy to conduct. It provides a great opportunity to give the customer and account team "heads-up" information on installing WebSphere on z/OS. It only takes an hour or two to complete the form, and another hour for a conference call with a "Subject Matter Expert".

Ensure you have sufficient Systems Programming Skills and Experience

WebSphere for z/OS utilizes most advanced features and functions within the operating system and are listed on page 9 of the "WebSphere for z/OS V4 Installation and Customization" guide. You will need systems programming skills in all these areas. If you try to set up the WebSphere runtime without good skills or assistance in these areas, you are bound to have many frustrating problems and delays.

The following skill areas are especially critical to a successful installation of WebSphere for z/OS:

- DB2 - to administer, tune, and diagnose WebSphere systems management databases and application tables
- UNIX Systems Services - to set up a functional HFS and UNIX environment
- TCP/IP - to configure connectivity for WebSphere clients and servers
- LDAP - to implement WebSphere naming and directory (JNDI) services
- RACF (or equivalent) - to authenticate WebSphere clients, servers and authorize access to resources
- Logger - to set up logstreams for RRS and the WebSphere error log
- Parallel sysplex - to implement multi-system configurations
- RRS - to implement resource recovery services and support two-phase commit transactions

No one person can posses all these skills. It takes a team of specialists to set up the WebSphere runtime. See the class catalogs at http://www.ibm.com/services/learning/us/ for specific courses and the "roadmaps" at http://www.ibm.com/services/learning/roadmaps/ for an organized view of the curricula.

Send your Systems Programmer to the Implementation Workshop (ES680)

It is very important attend the "WebSphere Application Server for z/OS Implementation Workshop" (ES680 - Classroom - 4.5 days). We have many examples where weeks are wasted if you skip this important education.

Identify responsibility for customizing, and managing the WebSphere runtime

WebSphere uses many advanced functions in z/OS and parallel sysplex which must be coordinated for a successful installation. Different systems programming specialties and departments must work together to set up and administer this complex environment. Traditional MVS systems programmers, database administrators (DBAs), security administrators, communications specialists, and administrators of subsystems such as CICS, IMS, and MQSeries are all key to this effort.

It is not so important who “owns” the administration of the WebSphere runtime, but someone (or group) must assume this over-all responsibility.

Review your initial objectives for implementing WebSphere

Are you just installing WebSphere in a sandbox to familiarize yourselves with the installation and customization processes? Do you have applications waiting to be deployed in this new environment? Are there availability, performance, and deadlines associated with this initial installation? Do you have representatives from the application development organization participating in your planning activities? Have you designed your initial configuration with security, network connectivity, availability and performance objectives in mind? These questions should be addressed and understood before setting up the runtime.

Size the right processor for your first test system

As part of planning for your initial installation, your first system should have the binary floating point hardware (9672 G5 or later) and at least 512Mbytes of central storage. (The WebSphere runtime servers can take over 200 Mb of real storage in a testing environment.)

Get some more DASD

You should also increase your paging subsystem capacity to handle the larger working sets. For an existing test or development system, we recommend you increase your paging subsystem by one 3390-3 volume. To store your runtime libraries and HFS files, you should probably add an additional volume. In addition, the use of tracing options in WebSphere to the SYSPRINT DD dataset may cause you to increase your JES spool space.

Know where the most valuable Resources are and how to get them.

- ☐ **Publications**
  You may download WebSphere documentation in PDF form at the following site:
  http://www.ibm.com/software/webservers/appserv/zos_os390/library.html
  Publications are updated periodically on this site. (The "Installation & Customization" and "Messages & Diagnosis" books were updated Jan. 2002.)

- ☐ **Support**
  WebSphere for z/OS Service Level information, and other information sources are anchored off this site: http://www.ibm.com/software/webservers/appserv/zos_os390/support.html

  You can also go the following IBM Support sites for the most up-to-date information: http://www.ibm.com/support/ or http://techsupport.services.ibm.com/server/support where you can find service planning information or search the technical support data base (RETAIN) for APARs, PTFs, and other keywords.

- ☐ **Download Site**
  To download the Application Assembly Tool (AAT), sample client, JCA "beta" CICS and IMS connectors, the SMF browser and more, go to:
  http://www.ibm.com/software/webservers/appserv/download_v4z.html

- ☐ **White Papers**
  The following site contains white papers, FAQs, Hints & Tips, Downloads, etc. from the IBM Technical Support organizations: http://www.ibm.com/support/techdocs

- ☐ **RedBooks**
  There are many technical publications that describe how to install and use z/OS, OS/390, WebSphere and many other products at http://www.redbooks.ibm.com
  Here are some examples:
  - ABCs of OS/390 System Programming (5 vols) - SG24-5597, SG24-5652 thru -5655
  - z/OS Version 1 Release 2 Implementation - SG24-6235
  - Parallel Sysplex Operational Scenarios - SG24-2079
  - Migrating WebSphere Applications to z/OS - SG24-6521

The next step - Preparing your System for the Installation

To implement WebSphere Application Server (WebSphere) for z/OS or OS/390, you must implement the necessary features, subsystems, and resources required for the runtime environment. This section supplements Chapter 2 of the "WebSphere for z/OS V4 Installation and Customization" guide with our experiences and what we consider "Best Practices" for preparing your system for WebSphere.

We strongly recommend that you take the time to properly prepare your z/OS (or OS/390) system before installing and customize the WebSphere runtime. If you jump in without following these recommendations, you may encounter many hard-to-diagnose time-consuming problems.

Configure your system for the WebSphere workload demands

WebSphere makes extensive use of z/OS resources. You may need to adjust the following settings to make this installation go smoothly:

- Increase ECSA (Extended Common System Area) by 400Mbyte in IEASYSxx for the WebSphere runtime load modules if they are going to be dynamically loaded into CSA (which is the recommended location).

- Make certain you can get a big address space. Some WebSphere servers must be able to get a 1Gbyte virtual region to run work. Make sure that any installation exits (IEFUSI) do not limit your virtual region size. We recommend that you specify REGION=0M so as not to limit their size.

- Add another page data set - one more volume may be needed if your system does any paging of the WebSphere server address spaces.

Take your DB2 DBA to Lunch!

WebSphere is not only a heavy user of DB2 for its systems management configuration data and LDAP tables, but most WebSphere applications are very heavy users of DB2. During the installation and customization of WebSphere, as well as during application deployment, you will frequently need SYSADM access, a good understanding of your DB2 subsystem(s) and JDBC, and assistance from your lead Data Base Administrator (DBA).

You must install DB2 Version 7 and apply the latest maintenance before you install the WebSphere runtime servers. DB2 Version 6 or 5 may still be kept for other DB2 databases. Unless you are installing the WebSphere 4.0.1 "Simple Configuration" (which is really the WebSphere SE 3.5 runtime), DB2 Version 7 is required for the JDBC 2.0 drivers and for local transaction support.

Review the recommendations in section "Guidelines, rules, and recommendations for DB2 and LDAP" in Chapter 2 of the "WebSphere Installation & Customization" book. We have seen many problems encountered while installing WebSphere (and running the IVP) to be caused by missing service or setup problems. Double-check your DB2 setup by examining the following important, but frequently overlooked items:

- Increase the MAX USERS (CTHREAD) and MAX BATCH CONNECT (IDBACK) settings. Use the sample job in DSN710.SDSNSAMP(DSNTEJ6Z) to display the "ZPARMS" settings of the running system. (An alternative is to use the DB2 Control Center to display these parms.)

- Define at least 200 buffers to the BP32K buffer pool. Use this command to display the current buffer pool allocations: '-dis bpool(active) detail'

- Verify JDBC 2.0 functionality. The JDBC IVP "sample01" JAVA application does not exercise JDBC 2.0 drivers nor RRS attach facility. A modified version that tests these functions can be found in the "DB2 Conundrum" whitepaper on Techdocs at

http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/WP100217 (This will also verify that the DSNJDBC plan is bound correctly and that it matches the .ser file.)

- Verify the level of DB2 code running on your system with the DSNTEJ6U sample job or run the DSNUTILB utility with the DIAGNOSE DISPLAY MEPL command. The module names, dates, and PTF number on the right of the report in EBCDIC.

- Make sure that any updates to the DB2 ERLY code are installed, and that you have IPLed your system to activate them.

- Check the JDBC service installed on your system. Use the following java program to display the service level:

  > export LIBPATH=/usr/lpp/db2/db2710/lib:$LIBPATH

  > java -cp /usr/lpp/db2/db2710/classes/db2j2classes.zip COM.ibm.db2os390.sqlj.util.DB2DriverInfo

  The typical output message looks like this:

  ```
  DB2 for OS/390 SQLJ/JDBC Driver build version is: DB2 7.1 PQ54756
  ```

Set up RRS

Resource recovery services (RRS) is required as the two-phase commit coordinator in WebSphere. Multiple RRS groups can exist in a sysplex, but only one instance can exist on an MVS image. You may already have RRS implemented for DB2, APPC, CICS, IMS, MQSeries, but you will have to increase the size of your logstreams to support the additional use by WebSphere. See the section “Recommendations for resource recovery services” (pages 40-42) in Chapter 2 of the “WebSphere Installation & Customization” book.

- For details on RRS, see z/OS MVS Programming: Resource Recovery, SA22-7616.

Set up Logger

Prepare for LDAP

WebSphere uses LDAP (Lightweight Directory Access Protocol) to store information in the name space and interface repository. (For this it uses a private protocol to access LDAP services.)

WebSphere also requires an JNDI (Java Naming and Directory Interface) server to access homes for EJBs and J2EE objects. This server can be on the same or different system, but we recommend that it be on the local MVS image, especially when first installing WebSphere.

Both uses of LDAP are for the “private use” of the WebSphere servers, so we recommend that you keep these name spaces separate from any other uses of LDAP in your installation.

Validate your TCP/IP configuration for WebSphere

TCP/IP is used extensively by WebSphere. Verify your configuration with the following tests:

- Make sure that Java apps can successfully access getlocalhost, gethostbyaddress, gethostbyname. This helps ensure that most TCP/IP functions are set up correctly for WebSphere.

- Telnet into UNIX Systems Services and issue these commands to verify that you can find your host name by IP address or IP host-name:

1. Get the local host name: **`hostname`**

   You will get a response such as: `wsc1.wscplex.washington.ibm.com`

   Use the output from the hostname command for the following nslookup command:

2. Get host address by name: **`nslookup wsc1.wscplex.washington.ibm.com`**

   You will get a response such as this:

   ```
   Server:  wsc1.wscplex.washington.ibm.com
   Address:  9.82.93.2
   Name:    wsc1.wscplex.washington.ibm.com
   Addresses:  9.82.93.2
   ```

   Use the dotted IP address from this display for the following command:

3. Get host name by address: **`nslookup 9.82.93.2`**

   You will get a response such as the previous nslookup display.

   Note: There is also a small java program 'InetInfo.java' which can be run to verify the same TCP/IP configuration. See techdocs for the program - http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/TD100609

Issue the 'hometest' command from TSO. It should show the correct TCP Host name, and corresponding IP address(es) and HOME IP addresses. If it doesn't produce the correct results then TCP/IP is not configured correctly.

Important Note: If the fully qualified TCP/IP HostName is greater than 24 characters, then a DNS will be required. Otherwise, the /etc/hosts file can provide the naming lookup.

The following TCP/IP servers should also be up to provide access:

- You must have an FTP server that can access the HFS for deploying applications.
- INETD should also be running so that you can telnet into UNIX System Services without logging on to TSO.

Implement a robust Unix Systems Services environment

It is important to have a "fully functional" UNIX systems services environment. Follow the instructions in *z/OS UNIX Planning, SC28-1890,* and complete your setup and customization (including the z/OS shell and utilities). Then use the z/OS UNIX Setup Verification program which can be downloaded from http://www.ibm.com/servers/eserver/zseries/zos/unix/bpxa1svp.html

For WebSphere, check the following:

- Specify enough threads, files, processes in your BPXPRMxx member of parmlib. Here is a starting list if you don't have it set up yet:

  MAXTHREADS:10000

  MAXTHREADTASKS:5000

  MAXFILEPROC:10000

  MAXSOCKETS in the AF_INET domain:12000

- Implement shared HFSes for your /usr/lpp/ product and WebSphere configuration HFSes even if you don't have multiple systems. See Chapter 15 in "z/OS UNIX System Services Planning" book (GA22-7800.) These and other books are available on the web at http://www.ibm.com/servers/eserver/zseries/zos/bkserv

- Set up individual HFS file systems individually mounted for Java, DB2, WebSphere, and other libraries, as well as for your OMVS users, temporary files and others...

- Implement DFS SMB for HFS file sharing from your workstation.

Get more productive with UNIX System Services environment and "tools"

The systems programmer responsible for setting up the WebSphere runtime and performing other management and diagnostic tasks should be familiar with the UNIX System Services environment and its tools. We even recommend that he/she be familiar with telnet environment and the vi editor.

The right tools for UNIX System Services can make it a lot easier for those not familiar with UNIX commands and environment. See "z/OS UNIX System Services Tools and Toys" at http://www.ibm.com/servers/eserver/zseries/zos/unix/bpxa1toy.html

Here are some other useful tools for your workstation to help with UNIX System Services.

- Telnet client for logging into the UNIX services environment without going through OSHELL or ISHELL. Tera Term is a good one: ftp://riksun.riken.go.jp/pub/pc/misc/terminal/teraterm/

- A powerful workstation editor. See PFE: http://www.lancs.ac.uk/people/cpaap/pfe

- An easy-to-use graphical FTP client such as WIN_FTP: http://www.ipswitch.com

- If you are not wedded to 'vi', get a good graphical text editor for X Windows such as NEDIT (Nirvana Editor): http://www.nedit.org (This requires an X-server such as Hummingbird.)

Application deployers and testers may need some tooling support to isolate from the "green-screen" environment. Allow them access into UNIX System Services via telnet and provide tools in REXX to do normal utility functions.

Set up WLM in Goal Mode

If you have not set up your system in goal mode, you may have to coordinate this effort with other users of your system and sysplex to ensure that this can be done without disruption. See the Goal Mode Migration Aid at http://www.ibm.com/servers/eserver/zseries/zos/wlm/

Implement a Sysplex environment, and prepare for a parallel sysplex

You must implement basic sysplex for WebSphere, even if it is only a monoplex. As you set up your logstreams, system datasets, etc. See the z/OS document on "Setting up a Sysplex" and Redbook called "Parallel Sysplex Cookbook". For your first WebSphere installation, however, you should limit your configuration to a single system until you get familiar with all the parts, and can configure it easily.

Security Preparations

Every z/OS installation has unique security requirements, naming standards, and profile templates. WebSphere provides some default definitions for servers, resources and other classes. If you can use a "sandbox" system without incorporating these into your production security administration, life will be easier. (Experiment with your first few WebSphere systems before incorporating the WebSphere security definitions into the overall corporate security scheme.)

WebSphere needs to define several new userids, groupids, UIDs. GIDs, profiles, and have access many system resources. As part of the customization dialog, a CLIST with RACF commands will be generated containing these RACF commands. Most customers have their own security schemes which may not accommodate these IBM-generated RACF commands

Here are some other security planning considerations that you should review with the security administrator before you install WebSphere:

- List-of Groups must be active for WebSphere security to work, because it connects several users to multiple server and management groups.
- Daemon requires access to parmlib concatenation to retrieve CTRACE settings in the CTIBBOxx member.
- All WebSphere servers must have READ access to any datasets or files in their JCL procedures.
- If you have a generic APPL class defined with UACC(NONE), you must define an APPL (CBS390) profile and gave READ access to it for all userids and groups used by the WebSphere servers, clients and administrators.
- Define the profile BPX.SAFFASTPATH in the FACILITY class to enable SAF fastpath support.
- If you do not load SBBOLOAD into LPA, you must add it to the program control list in the RACF PROGRAM class. (With z/OS R2, you can use the FACILITY class profile BPX.DAEMON.HFSCTL class. This will cause only HFS files to be checked for program control.)
- If you have an exit that checks for valid accounting codes, you may need to specify an accounting value for spawned address spaces. Use the _BPX_ACCT_DATA= variable in the current.env file.

Set up your TSO user Ids with the necessary capabilities

TSO userIDs with OMVS segments with sufficient (if not maximum) memory size, threads, processes, files, etc., and their own HFS which is auto-mounted when they logon. Make sure you have unique UIDs and GIDs for all your users, and strictly control of userIDs with UID=0. Use the “User List” in TSO ISHELL and sort on UIDs using the “File” pull-down to get a list of all the UIDs assigned in your system. (You must be in “superuser” mode to issue this command.)

You should give the WebSphere installers and application deployers READ access to the BPX.SUPERUSER profile in the FACILITY class so they can have get in superuser mode if necessary to have write access to files in the WebSphere configuration HFS.

The systems programming tasks required for setting up WebSphere require many TSO functions which require access to vital functions and sufficient resources. Here are some important points:

- Many functions require an OMVS segment, so we suggest that all sysprogs have this.
- Access to the BPX.SUPERUSER profile in the FACILITY for the primary installers and deployers. (Except for a few situations, most will not need to have a UID=0.)
- At least one TSO userid with a UID=0. (There are a few occasions during the installation that this is required.)
- A special userid will be defined for WebSphere Systems Management authority which is required for important key functions during the installation of WebSphere.
- Large virtual memory specifications (unlimited or at least 1 Gbyte.)
- DB2 SYSADM authority (or ready access to someone who does.)

Install WebSphere in its own SMP/E zone

WebSphere product is distributed similar to other products and includes PDSEs and HFS files.

We recommend that you install WebSphere in a separate zone, but you must turn on cross-zone checking to make sure you have all the prerequisite maintenance in other components applied. This makes it easier to manipulate different levels of the distributed code which exists in it HFS files, PDSs, and PDSEs.

We recommend that you put the eligible WebSphere, DB2 and LE libraries into your linkpack area (LPA) to use common storage more efficiently and minimize private copies. Here is our suggested list for LPA libraries:

SBBOLPA

SBBOLOAD - a PDSE, so must be loaded with SETPROG command

SBBOMIG - a PDSE, so must be loaded with SETPROG command

SCEERUN - the Language Environment library

Apply the latest Maintenance and Verify the Runtime

Use the WebSphere Program Directory and PSP buckets in IBMLink to apply the latest PTFs, and any co-requisite maintenance. There will also be several other z/OS system components that may need to be upgraded as part of this installation.

Keep as up-to-date as possible with maintenance for WebSphere, Java, DB2, RRS, WLM and most other components of z/OS... During the 1st quarter of 2002, we recommend checking the PSP buckets, and WebSphere support web site at http://www.ibm.com/software/webservers/appserv/zos_os390/support.html. For the latest WebSphere maintenance, go to this web site, click on "Solutions" (on the left) and you will see a list of documents. One of the top items should be called "Integrated APAR/PTF table for WebSphere Application Server V4.0.1 for z/OS."

Verify the maintenance levels of your runtime for the following components (specific service levels mentioned here are only examples and subject to change):

- **Java**: Go to UNIX System Services and issue this command: java -fullversion

  The results will be something like this:

  ```
  java full version "J2RE 1.3.1 IBM OS/390 Persistent Reusable VM build
  hm131s-20011206"
  ```

- **WebSphere**: There are actually two component Ids for WebSphere V.4.0.1:

  For compid 5655A9801(POK), go to the joblog of any server region and look for message BBOU0245I which will be about six lines from the top:

  ```
  BBOU0245I CURRENT CB SERVICE LEVEL IS build level W401017 release
  cb401_serv date 01/23/02 11:00:11.
  ```

  (This is called "Pokipsy service level 17")

  For compid 5655A9800 (RAL), it is trickier. If you set TRACEBUFLOC to SYSPRINT, you can go to the SYSPRINT of an application server region and look for "build level:" which is about 55 lines down and looks like this:

  ```
  ExtendedMessage: Build number: L00PTF03
  ```

(This would be called “Rally service level 3”)

DB2: Check the DB2 PSP buckets for the latest maintenance and check the level of your system’s DB2 maintenance as described in the DB2 section above.

You are now ready to Install and Customize WebSphere on your z/OS (or OS/390) system. See the next section for guidance on the actual installation steps.

The next step - Installing the Runtime

The actual installation and customization of the WebSphere Application Server (WebSphere) for z/OS consists of a complex sequence of manual activities, jobstreams, and REXX execs. It can take as little as an hour, or it can take weeks depending on how carefully you prepare your runtime and follow directions. Installing the runtime takes practice, an understanding of the WebSphere system structure, and many in-depth systems programming skills. Use the “Installation and Customization” guide along with these recommendations to install the WebSphere runtime. (Pay attention and know what you are doing.)

Use the ISPF Installation Dialogs Effectively

We recommend following the following steps to familiarize yourself with these dialogs. See the document “Using the ISPF Dialogs” found at the following location for some tips and hints: http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/TD100589.

While the dialogs coordinate the specification of your customized variables, they are not a panacea for careful planning, understanding your z/OS environment, and following directions.

- You must validate the customized variables with your communication specialist, your DBA, and security administrator.
- You must chose unique UIDs and GIDs for the new userids defined in the dialogs.

Practice and Experiment with the Dialogs

The very first time you use the ISPF dialogs, you should go through the whole process including the generation of the job streams, **but do not run them**.

- Use the IBM defaults or substitute your own values the first time around.
- Examine the output in the xxx.INSTALL.CNTL and INSTALL.DATA partitioned data set members and the xxxx.SAVECFG data set where you saved them.
- Understand how your customized variables affect the generated jobs and data files by browsing each one using the customized instructions in the BBOINSTR member of the xxx.INSTALL.CNTL dataset as a guide.

Common Mistake:
If you change any of the values on the customization dialogs after generating the jobs and data, don’t be tempted to make manual corrections to the target CNTL or DATA members. Regenerate all the jobs and data.

Understand the Installation Steps

As you follow the steps described in your customized installation instructions, it is important to understand what is done at each step by reviewing the jobs being submitted and examining the output. This will enable you to better diagnose any problems and manage the runtime in the future.

Most users find that they don't have everything specified correctly in the dialogs the first time around, or may not understand the effects of the variable specifications before they start submitting the jobs. Consider installing a practice runtime either on a "disposable" system, or on a system where you can easily back out what you have tailored. This also helps you understand the structure of the WebSphere runtime, when you tear it down and start over. (The whole process from starting the dialogs through running the "bootstrap" takes about an hour once you get the practice.)

Install the runtime - Pay Attention!

Here are the general steps to install the runtime:

1. Manual configurations to z/OS parameter libraries and workload manager.
2. Create logstreams and allocate datasets.
3. Create security definitions for WebSphere and LDAP.
4. Create and populate the configuration HFS and libraries.
5. Create and Load the DB2 tables for WebSphere systems management and LDAP.
6. "Bootstrap" the WebSphere runtime servers, configuration definitions, models, and name spaces.

This is not a "Wizard Installation Process" or like most other products you have installed on z/OS. As you follow the steps described in your customized installation instructions (BBOINSTR), it is important to understand what is done at each step and what was done on your system.

- This is also a "reading, spelling, and typing" exercise. We have found that most problems occur from making an innocent typing or error of omission.
- Pay attention to the "User ID requirements" in the generated instructions. This often is the cause for jobs not running successfully.
- Verify each job or step as you run it and check it off on your customized instructions.
- Look carefully at the job's output (not just the return code) to make sure everything is installed correctly. You should see no error messages in the job's output except where specifically noted in the instructions.

The following comments specific to each step should help you understand the installation:

Manual Configuration Updates

These steps affect parts of your system that are usually tightly controlled and changes that should be reviewed by the lead Systems Programmer responsible for this z/OS system. Updates to WLM, SYS1.PARMLIB, and TCP/IP configuration could have been done by "canned" jobstreams, but most installations would not allow this (for good reasons.)

Create Logstreams and Datasets

The first four jobs (BBOMSGC - BBOWCTR) are straightforward (simple) systems programming tasks. (If you are not using NLS, you can skip BBOMSGC.)

Update Security Definitions

The next four jobs (BBOCBRAJ - BBOLDRAK) generate and then issue the RACF commands necessary to define the users, groups, profiles, and permissions for the WebSphere runtime servers and LDAP. The recommended approach here is to run the jobs that generate the commands, and take them to your

security administrator for approval. Then let him or her actually issue those commands or submit the supplied jobstreams.

If your installation has different profiles structures, the ones generated by these execs may have to be modified to suit.

Your installation must have "list of groups" turned on for these to work, because the servers must be connected to the WebSphere administrator group.

The following RACF classes are activated by default:

- CBIND for controlling access to the WebSphere servers and objects in the servers
- SERVER for controlling access from the server regions to the control regions
- STARTED to assign userids to the server STC's
- LOGSTRM for the WebSphere error log
- (The FACILITY class is also activated but not used. Most installations have this active anyway.)

The first time you install WebSphere, we recommend that you don't activate any of the optional security classes. (You can save these for later challenges.)

After you get the runtime up and successfully run the IVP, you may want to replace the built-in administrators defined for WebSphere, or at least change their passwords.

If you have some other security mechanism such as Top Secret or ACF2 instead of RACF, then you must change the RACF commands into the appropriate syntax. (Ask your customer's security administrator to contact the vendor (CA) for guidance on WebSphere customization, and for the latest maintenance.)

Create and Populate the Configuration HFS and System Libraries

The next three jobs (BBOWCHFS - BBOWCPY1) run REXX scripts in the batch to define, customize, and load data into the configuration HFS. For this reason the owner of these jobs must have a UID=0 so you can either:

- Submit by a user with a UID=0,
- Submit by a user with surrogate access to a userid with UID=0, or
- Submit with the user id and password of a userid with UID=0.

Review the output of these jobs so you can see where the configuration files were built and how the directories are structured. Also note that ownership is reassigned to the WebSphere administrator and permission bits are set so you must be connected to that group to even read them.

Common Mistakes:

1) Pay attention to the "User ID requirements" in the generated instructions. This often is the cause for jobs not running successfully.
2) Tromping around in the configuration HFS with a UID of 0 will make the files inaccessible to the WebSphere runtime servers and administrators. (Be careful and know what you are doing.)
3) If you decide to change any of the customized variables after you have submitted any of these jobs, don't be tempted to make manual modifications to the generated jobstreams or data. Back off the installation and start over by regenerating all the jobstreams and start over from the BBOMCFG job.

Create and Load the DB2 Databases

You need to submit the next eight jobs (BBOMCRDB - BBOLD2DB) under a userid with DB2 SYSADM authority. (See the three methods of setting the owning userid in the section above.)

The systems management database consists of over 90 tables each with their own tablespace and a hard-coded prefix of "BBO."

LDAP: The standard installation jobstreams use RDBM for LDAP customization. (TDBM is necessary for double-byte character sets - DBCS, and will be the default in future releases of WebSphere. If you wish to use TDBM instead of RDBM for the LDAP, follow the instructions in techdocs article called "Setting up LDAP with TDBM" at http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/WP100222

After the LDAP jobs run, take a few minutes to examine the following three files in your /WebSphere390/CB390/<sysplexname>/etc/ldap directory:

- sysx.bboslapd.conf
- sysx.bboldif.cb
- sysx.dsnaoini

At this time you can also use the following LDAP search command (or an LDAP browser) to look at the name-space (all on one command line in OMVS):

ldapsearch –v –p 1389 –h 127.0.0.1 –D "cn=CBAdmin" –w *password* –b "*was_Suffix*" "objectclass=*"

Common Problems:

1) If you receive SQLCODE=-904, you may not have enough 32K buffer pools.
2) If you receive SQLCODE=-551, you don't have the authority to perform this operation.
3) If you encounter errors during any of these jobs and you need to change some customized variable, it is often better to start over with the first job (BBOMCRDB) which drops all the WebSphere Systems Management tables it the first step.
4) If you need to rerun the job to create the LDAP database (BBOLDTBC), you must first run job BBOLDTBD to delete it.

"Bootstrap" the WebSphere Runtime

Before you start the bootstraps, you may want to make some temporary changes to your environment and set a few variables that will propagated to all the WebSphere the servers:

- Disable ARM (automatic resource manager) to prevent servers from being restarted with continuous JCL errors. Use the MVS command: SETXCF STOP,POLICY,TYPE=ARM
- Specify "TRACEBUFFLOC=BUFFER SYSPRINT" in the ../<plex_name>/initial/configuration.env file. (Usually something like /WebSphere390/WAS401/WSCPLEX/initial/configuration.env) This way, you will be able to browse informational, error, and other messages in the SYSPRINT dataset for your servers.

Phase 1: After starting up your LDAP server and the Ctrace writer, you start the WebSphere daemon for the first time with the cold-start parms.

STEP 00 System Management Bootstrap initiation

STEP 01 Create administrator

STEP 02 Import conversation

STEP 03 Load initial environment file

STEP 04 Create SM initial references

STEP 05 Commit model

STEP 06 Complete build

STEP 07 Cleanup repositories

STEP 08 Complete Phase1

When you get the "BBOU0134I WS BOOTSTRAP PHASE 1 IS COMPLETE." message, stop the daemon (and all the server address spaces if necessary.)

Sometimes the bootstrap phases do not complete, but appear to 'hang' without any error messages, because of time-out problems. Sometimes, if you try it again after you stop or cancel all the WebSphere address spaces, the bootstrap process will pick up where it left off and continue successfully.

Naming and IR Clients: Next start the daemon with no parameters and run the two naming clients (BBONMC & BBOIRC) under the userid for the WebSphere administrator as specified in the instructions. When these complete, stop the daemon again.

Phase 2: Restart the daemon with cold-start parms again to complete the bootstrap process (phase 2), and watch the messages for each phase on the SYSLOG (console)...

STEP 09 Interface repository boot

STEP 10 Process J2EE server ear files

STEP 11 Create CB 390 SM name space

STEP 12 Create naming registration entries

STEP 13 Do naming registration for CB servers (IR, Naming, SM)

STEP 14 Delete or commit elements

Common Problems:

1) JCL errors in the started task procedures might cause the WLM application environment to be quiesced, or just keep the bootstrap from progressing.
2) Errors in the WLM Application Environment definitions may also cause JCL errors or other failures.
3) JCL errors in the started procedures for the WebSphere servers may cause the application environments to be quiesced. If this occurs, you may be able to correct the proc, activate the application environment with the V WLM, APPLENV=xxxx, RESUME command, and the bootstrap will continue.
4) If you are not in WLM goal mode, the application server regions will not start and you will be "hung" at step 6(?)
5) Incorrect IP host names, port numbers, or other specification errors will also first be noticed during the bootstrap. Some of these are best corrected by dropping everything and starting over. (See the following section.)
6) RRSAF identify failures may be caused by errors in the TCP/IP or DNS configuration, or in the DB2 location name specification.

There are other reasons why the bootstrap process will not complete. If you can correct the cause of error, restart the daemon (parms='-orbcbi cold'), the bootstrap processes will resume where it left off.

When you have to start over ...

If you need to reinstall WebSphere, you must first remove or un-install WebSphere or the steps that need to be redone. Here are some guidelines for redoing the steps:

The beginning steps should not have to be redone unless you made some mistakes or want to make some changes.

- WLM definitions (unless you changed the server names.)
- The manual updates to parmlib members, unless you changed anything that was customized there.

- The first few (4) jobs (MMS, logstreams, Ctrace datasets)

RACF definitions for WebSphere and LDAP may have to be fixed if you changed any server names, userids, group names, UIDs, or GIDs, logstream name. Look at the RACF commands created in the BBOWBRAK and BBOLDRAK members. Also, you should get rid of the old names to clean up the RACF data base.

To repopulate the HFS and DB2 tables, you must "erase" or wipe out the WebSphere runtime configuration databases and HFS files (including LDAP tables):

- In UNIX System Services, you must be a superuser and go to the WebSphere configuration home directory (/WebSphere390/CB390/ or wherever you specified it) and delete all directories and files with the following command: >rm -R *

- Drop the LDAP tables by submitting the BBOLDTBD job from the INSTALL.CNTL dataset. (The SM tables will be dropped by the first step of the BBOMCRDB job so you don't have to drop them with a separate job.)

Begin your re-installation by following the updated instructions in the BBOINSTR member with the BBOWCHFS job which allocates the configuration HFS.

Resources

- **Publications**
  You may download WebSphere documentation in PDF form at the following site:
  http://www.ibm.com/software/webservers/appserv/zos_os390/library.html

- **Support**
  Service Level information, and other information sources are anchored off this site:
  http://www.ibm.com/software/webservers/appserv/zos_os390/support.html

  You can also go the official IBM Support sites for the most up-to-date information:
  http://www.ibm.com/support/ and http://techsupport.services.ibm.com/server/support where you can search the technical support data base (RETAIN) for APARs, PTFs, and other keywords.

- **Download Site**
  To download the Application Assembly Tool (AAT), sample client, JCA connectors, and more, go to: http://www.ibm.com/software/webservers/appserv/download_v4z.html

- **White Papers**
  The following site contains white papers, FAQs, Hints & Tips, Downloads, etc. from the IBM Technical Support organizations: http://www.ibm.com/support/techdocs

- **RedBooks**
  There are many technical publications that describe how to install and use z/OS, OS/390, WebSphere and other products. Their web site is at http://www.redbooks.ibm.com

Summary

Installing WebSphere takes planning, education, skills, preparation, and careful attention to detail and following direction. (Unfortunately, this paper complicates your tasks by adding another set of instructions.) Make sure you take advantage of resources such as web sites (see above), Q&A forums, IBM Global Services, and the IBM support center.

The next step is to run the Installation Verification Program (IVP) which will not only verify that your WebSphere runtime is configured correctly, but will also give you some practice with installing an application.